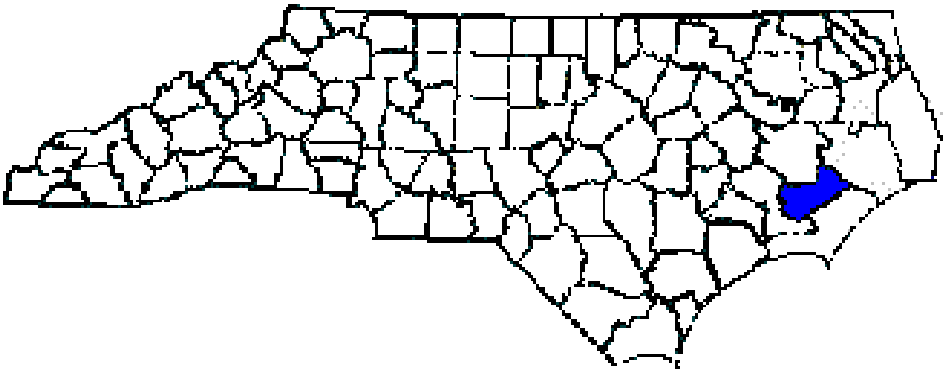
ANNUAL REPORT FOR 2010



Three Swamp Mitigation Sites
Pamlico County
TIP No. R-2539A&B

Prepared by:
Natural Environment Unit & Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following summarizes the monitoring activities that have occurred in the past year at the Three Swamp Mitigation Site. The three sites are located at the Upper Broad, Deep Run and Goose Creek stream crossings and are adjacent to NC 55 in Pamlico County. The sites were constructed to provide compensatory mitigation to offset impacts for T.I.P.'s R-2539A and R-2539B. The 2010-year represents the fourth year of hydrology and vegetation monitoring following construction. The sites must demonstrate hydrologic and vegetation success for a minimum of five years or until deemed successful.

In March 2007, groundwater monitoring gauges were installed to monitor hydrology on the sites. Three groundwater gauges were positioned within the restoration areas, with one gauge located at each of the stream crossings. This report utilizes rainfall data provided by the N.C. State Climate Office.

Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall. The 2010-year represents the fourth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2010 monitoring period.

The 2010 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 290 trees per acre.

Based on the results from the fourth year of monitoring, NCDOT will continue to monitor vegetation and hydrology at the Three Swamp Mitigation Site during 2011.

1.0 INTRODUCTION

1.1 Project Description

The Three Swamp Mitigation Site consists of approximately 4.23 acres of riverine wetland restoration and 11.99 acres of riverine wetland enhancement. These sites were constructed to provide compensatory mitigation to offset wetland impacts for T.I.P. projects R-2539A and R-2539B. The sites are located immediately adjacent to the roadway project at the Upper Broad Creek, Deep Run Creek and Goose Creek crossings in Pamlico County.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five consecutive years or until the site is deemed successful. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival.

Activities in 2010 reflect the fourth year of monitoring following the restoration efforts. Included in this report are analyses of hydrologic and vegetation monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 Project History

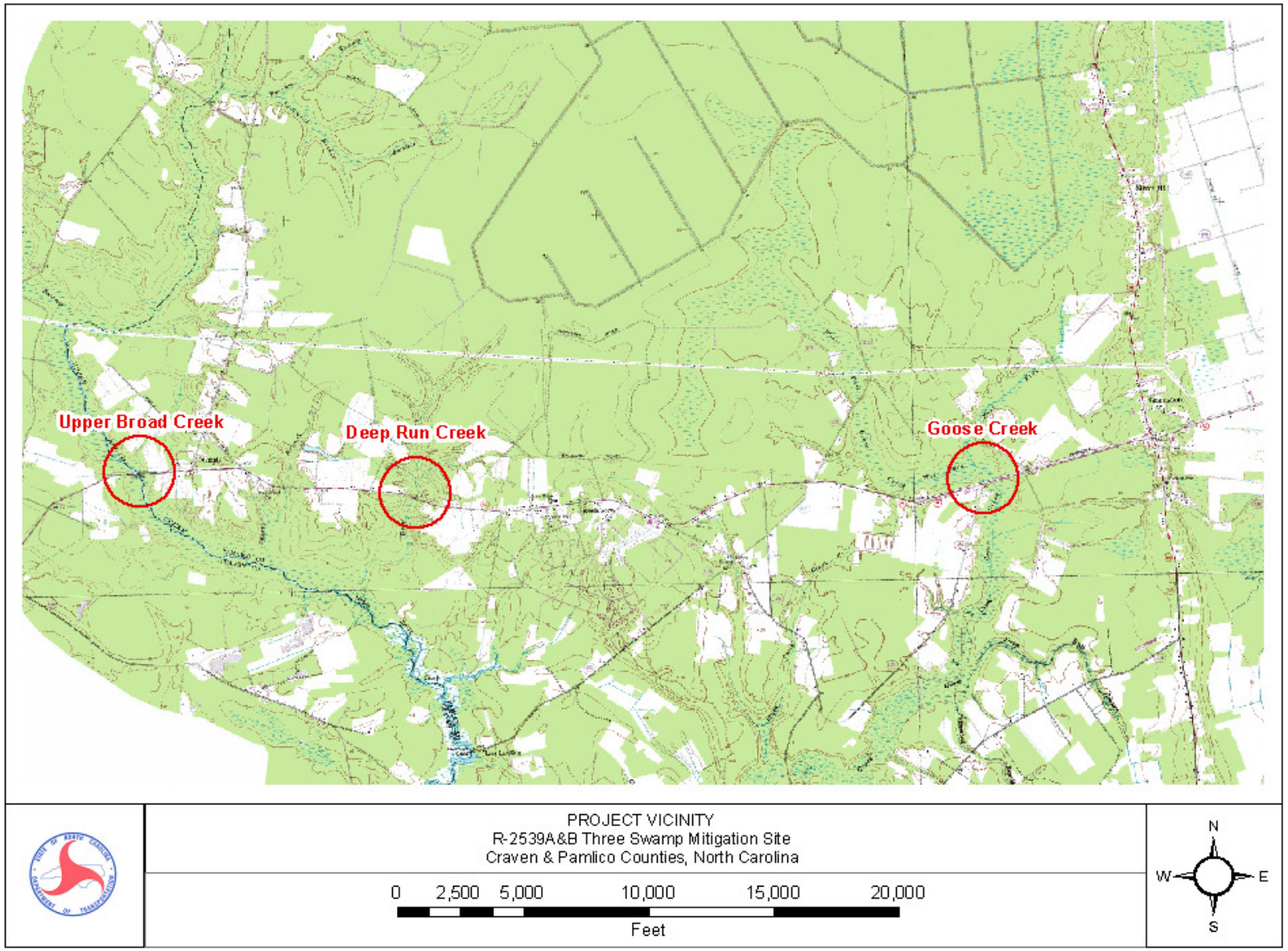
January 2007	Sites Constructed
February and April 2007	Sites Planted
March – December 2007	Hydrologic Monitoring (Year 1)
July 2007	Vegetation Monitoring (Year 1)
March – December 2008	Hydrologic Monitoring (Year 2)
August 2008	Vegetation Monitoring (Year 2)
March – December 2009	Hydrologic Monitoring (Year 3)
June 2009	Vegetation Monitoring (Year 3)
March - December 2010	Hydrologic Monitoring (Year 4)
June 2010	Vegetation Monitoring (Year 4)

1.4 Debit Ledger

Table 1. Three Swamp Mitigation Site Debit Ledger

Three Swamp			**TIP DEBIT**
Wetland Type	**As-Built Quantity**	**Acres Remaining**	**R-2539B**
Riverine Wetland Restoration	4.23	2.84	1.39
Riverine Wetland Enhancement	11.99	11.99	

Figure 1. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

The hydrologic success criteria established for the Three Swamp Mitigation Sites, as stipulated in the approved mitigation plan, require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall.

The growing season in Pamlico County begins on March 17 and ends November 15. The dates correspond to a 50% probability that air temperature will drop to 28°F after March 17 and before November 15; thus, the growing season is 244 days. Local climate must represent normal conditions for the area.

2.2 Hydrologic Description

Three groundwater monitoring gauges were installed within the restoration areas of the three sites (Figure 2, 3, and 4) in March 2007. Rainfall data is supplied by the NC State Climate Office from an official weather station in Trenton to assist in comparison of the rainfall data to groundwater recharge. The groundwater gauges record water levels on a daily basis. Monitoring data for 2010 represents the fourth year of hydrologic monitoring for the sites.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that saturation occurred within 12 inches of the ground surface was determined for each groundwater-monitoring gauge. This number was converted into a percentage of the 244-day growing season (March 17 – November 15). Table 1 provides the 2010 hydrologic results; Figure 2, Figure 3, and Figure 4 are a graphical representation of these results. Appendix A includes graphs of the data recorded at each groundwater gauge. Daily rainfall events recorded at the official weather station in Trenton are included on each of the groundwater gauge plots.

Table 2. Hydrologic Monitoring Results

Monitoring Gauge	Actual %	Dates of Success
S-GW1	20.9	Mar 17-May 6; Aug 13-Sept 24 Sept 27-Nov 15
S-GW2	30.3	Mar 17-May 9; June 29-Sept 10 Sept 27-Nov 15
S-GW3	20.1	Sept 28-Nov 15

2.3.2 Climatic Data

Figure 5 is a comparison of the 2010 monthly rainfall to the historical precipitation (collected between 1978 and 2010) for Trenton, North Carolina. This comparison gives an indication of how 2010 relates to historical data in terms of climate conditions. The NC State Climate Office provided all local rainfall information.

For the 2010-year; the months of April, May, July, October and November recorded below average rainfall. The months of January, February, March and August recorded average rainfall, while June and September recorded above average rainfall. Overall, 2010 experienced an average to below average rainfall year.

2.4 Conclusions

The 2010-year represents the fourth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2010 monitoring period.

NCDOT will continue to monitor the Three Swamp Mitigation Sites for hydrology.

Figure 2. Monitoring Gauge Location Map

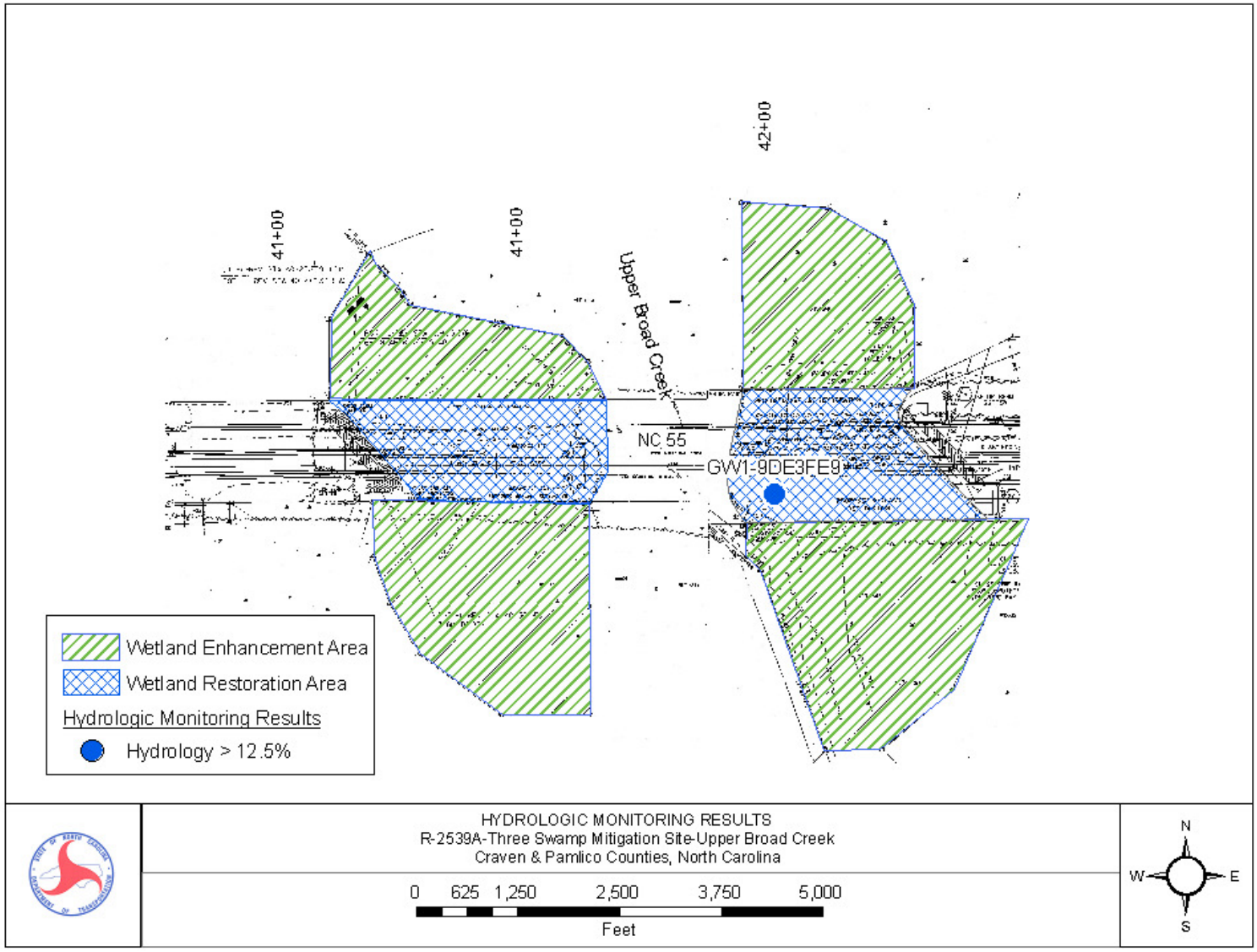


Figure 3. Monitoring Gauge Location Map

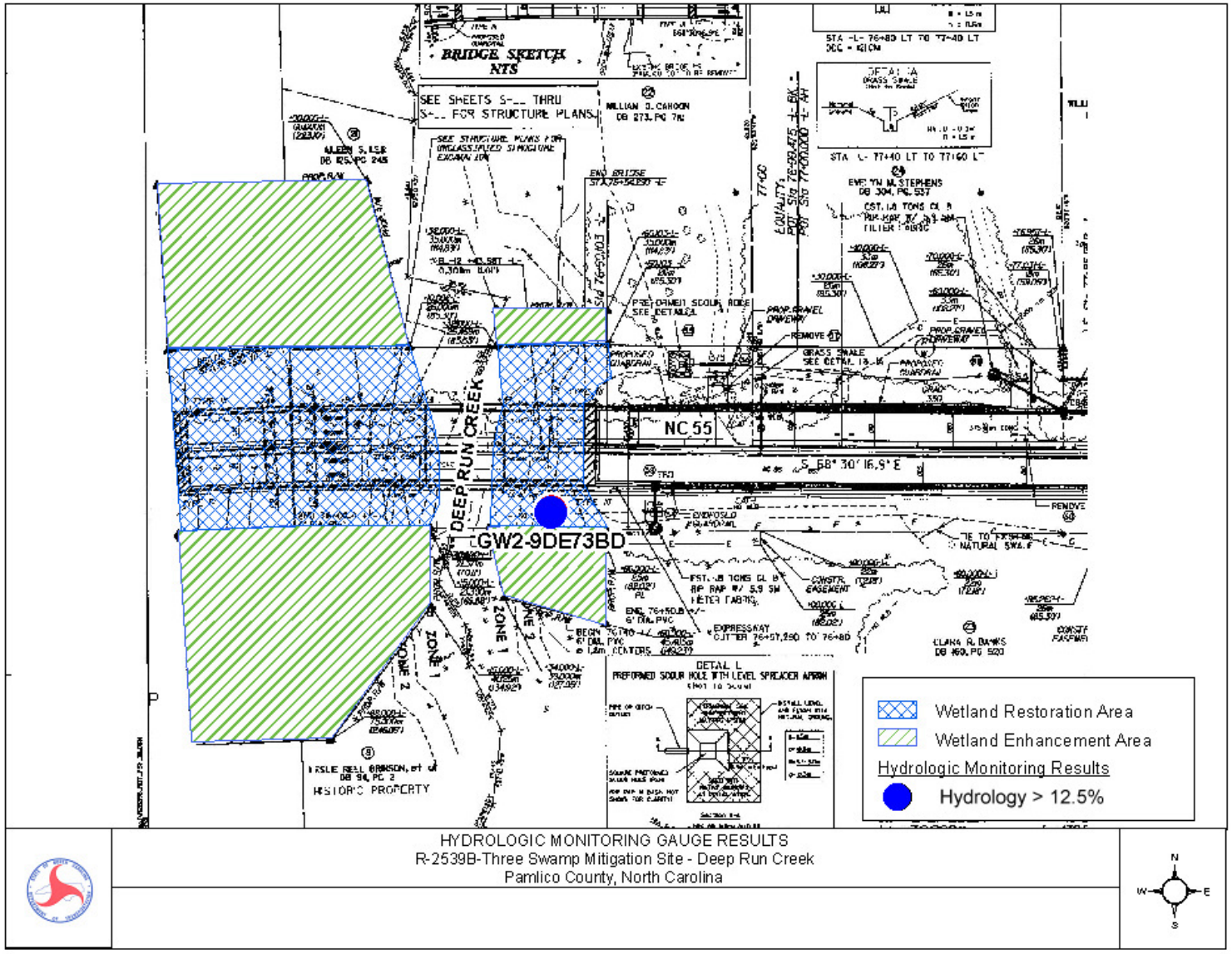


Figure 4. Monitoring Gauge Location Map

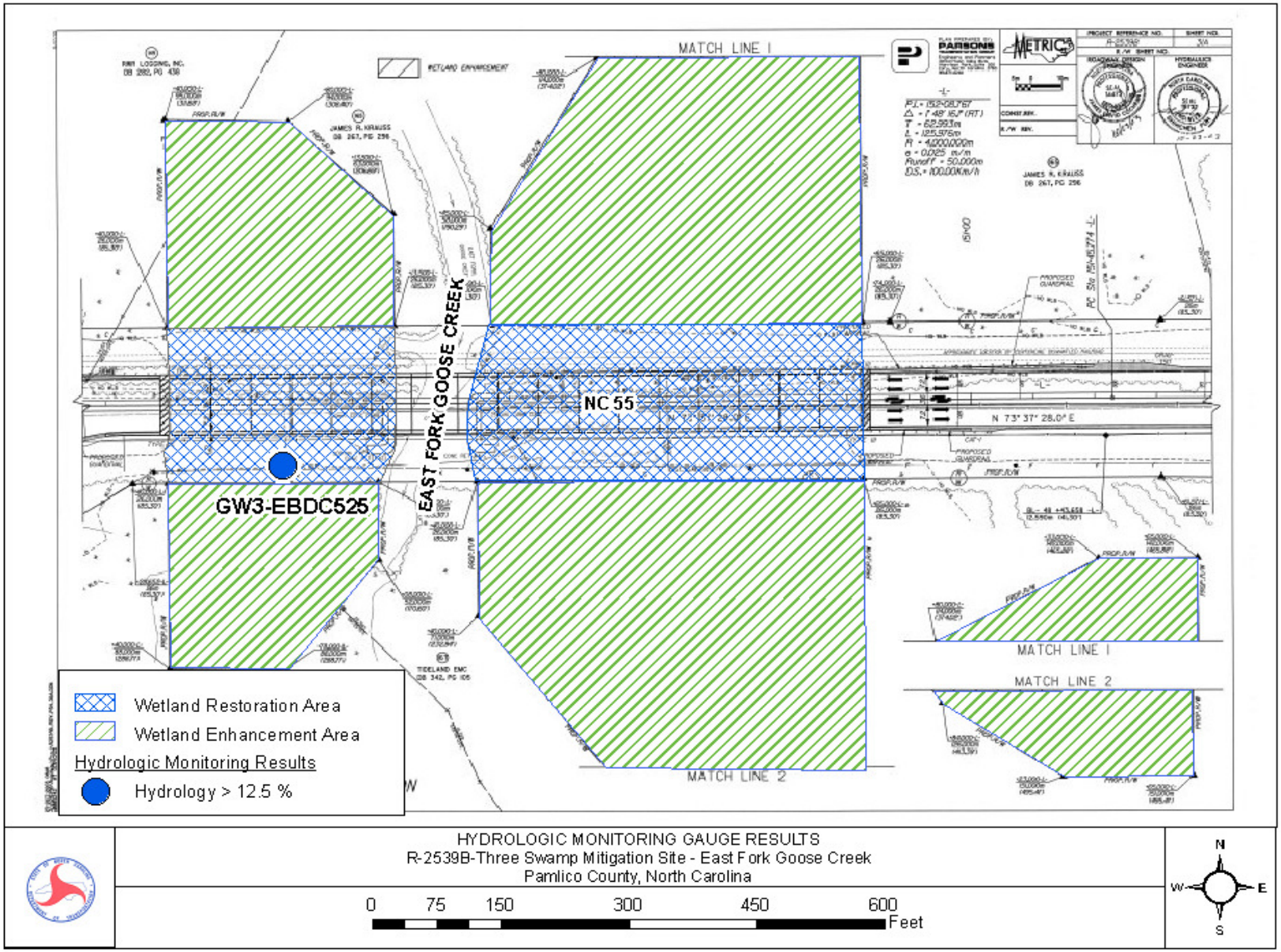
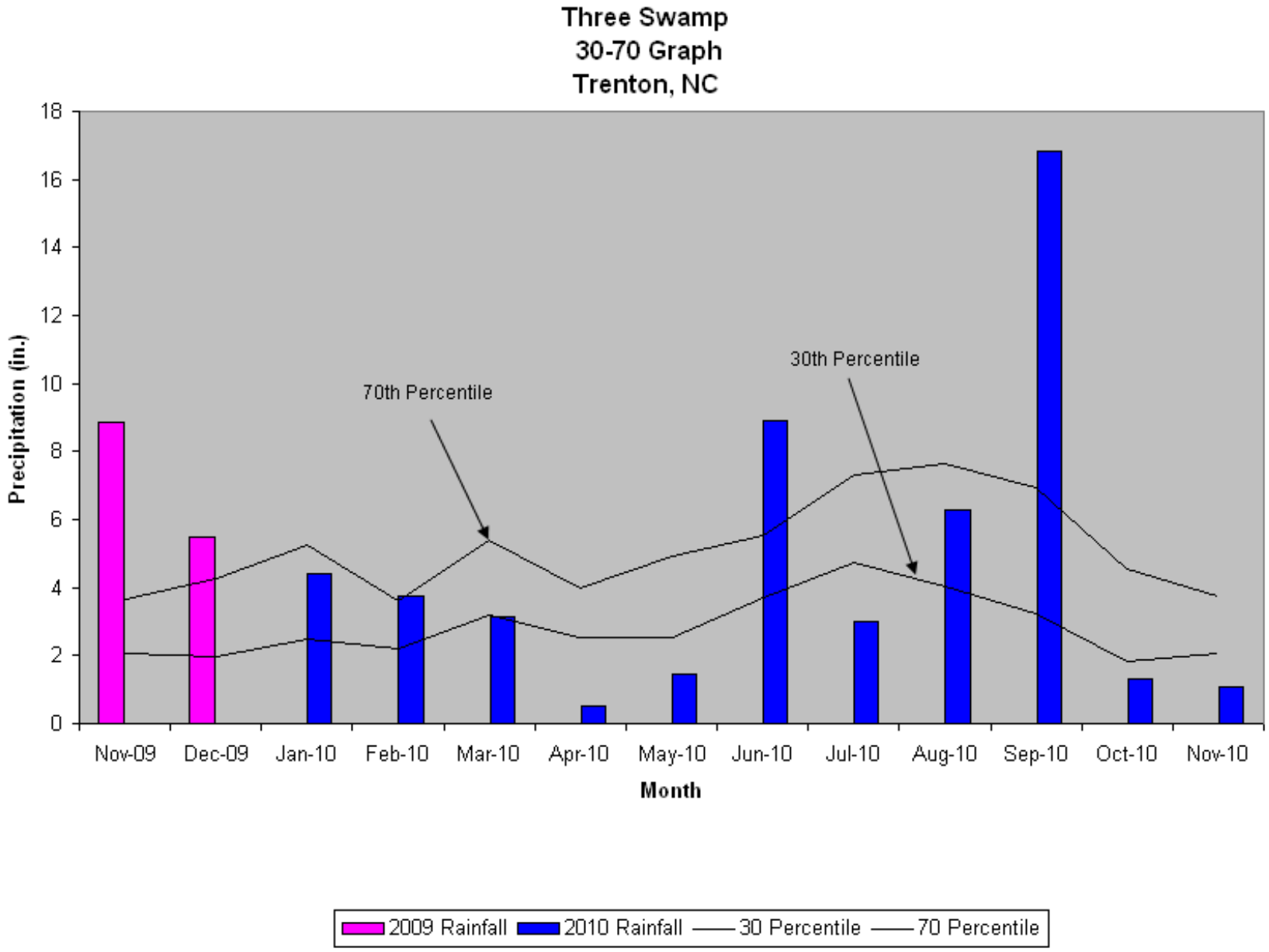


Figure 5. 30-70 Percentile Graph



3.0 VEGETATION: THREE SWAMP MITIGATION SITES (YEAR 4 MONITORING)

3.1 Success Criteria

Success Criteria states that NCDOT shall plant 680 stems/acre of the approved planting list. Vegetation success shall be measured by survivability over a 5-year monitoring period. Survivability will be based on 320 stems/acre after 3 years and 260 stems after 5 years. A survey of vegetation during the growing season shall be conducted annually over the 5-year monitoring period, and submitted to the Regulatory Agencies. If the surviving vegetation densities are below the required thresholds after the 5-year monitoring period the site may still be declared successful, at the discretion and written approval from the Regulatory Agencies.

3.2 Description of Species

The following tree species were planted in the Wetland Restoration Area:

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Taxodium distichum, Baldcypress

Fraxinus pennsylvanica, Green Ash

Nyssa aquatica, Water Tupelo

Liriodendron tulipifera, Tulip Poplar

3.3 Results of Vegetation Monitoring

Table 3. Vegetative Monitoring Results

Plot #	Swamp Blackgum	Baldcypress	Green Ash	Water Tupelo	Tulip Poplar	Total (2 year)	Total (at planting)	Density (Trees/Acre)
Plot 1 (Upper Broad Creek)	5	17	22	2		46	46	680
Plot 2 (Deep Run Creek)		15	3	2	3	23	52	301
Plot 3 (Goose Creek)	5	22	9	7	1	44	77	389
Average Density (Trees/Acre)								456

Site Notes: Other vegetation noted: stinkweed, pine, trumpet creeper, ragweed, dogwood, woolgrass, sweetgum, tear thumb, wax myrtle, fern, red maple, sedge, baccharis, fennel, black willow, goldenrod, cattail, *Juncus* sp., *Sagittaria* sp., and various grasses.

3.4 Conclusions

There were three vegetation monitoring plots established throughout the 4.23 acres of riverine wetland restoration. The 2010 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 290 trees per acre.

NCDOT will continue vegetation monitoring at the Three Swamp Mitigation Sites in 2011.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The 2010-year represents the fourth year of hydrologic monitoring for the Three Swamp Mitigation Sites. All three groundwater gauges met the criteria for the 2010 monitoring period.

The 2010 vegetation monitoring of the sites revealed an average tree density of 456 trees per acre. This average is well above the minimum success criteria of 290 trees per acre.

NCDOT will continue to monitor the Three Swamp Mitigation Sites for vegetation and hydrology in 2011.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS, SITE PHOTOS

R-2539A Upper Broad Creek

Photo 1

Photo 2

Photo 3

Photo 4

June 2010

R-2539B Deep Run Creek

Photo 1

Photo 2

Photo 3

Photo 4

June 2010

R-2539B Goose Creek

Photo 1

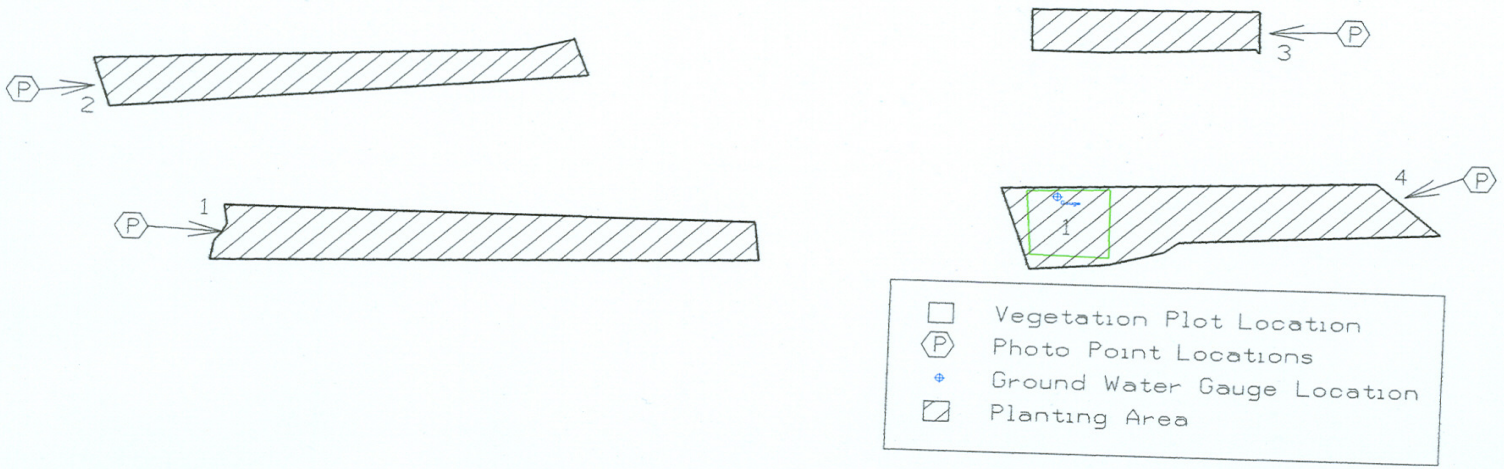
Photo 2

Photo 3

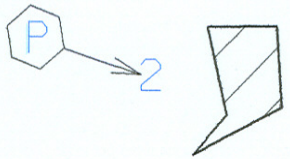
Photo 4

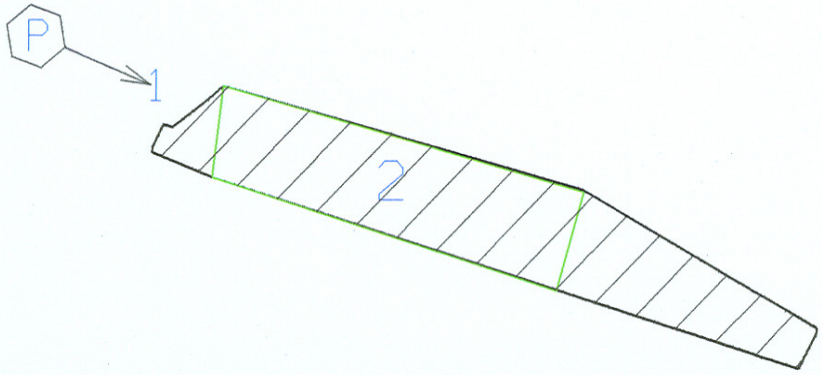
June 2010

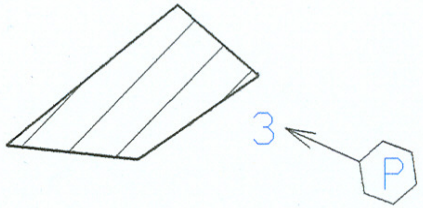
R-2539A - Upper Broad Creek
NC 55 Craven and Pamlico Counties

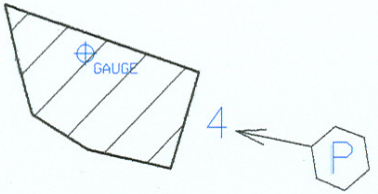


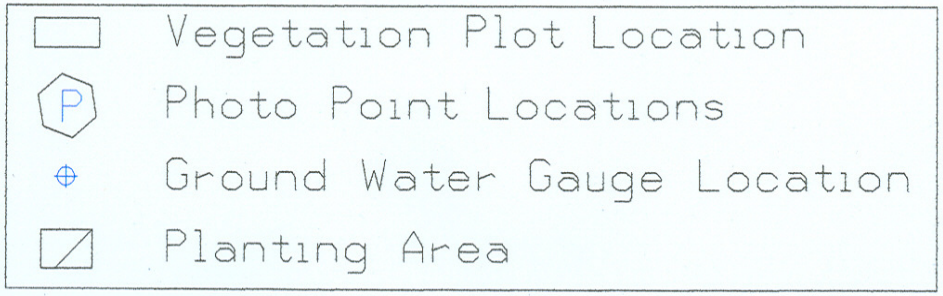
R-2539B - Deep Run Creek
NC 55 Pamlico County











R-2539B - Goose Creek
NC 55 Pamlico County